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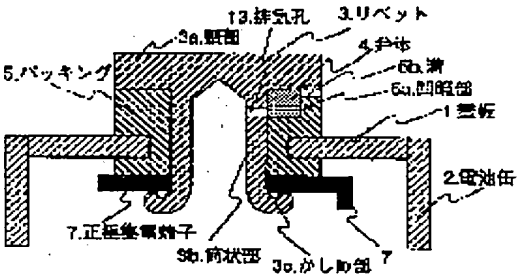
(54) ANGULAR SEALED STORAGE BATTERY

(57)Abstract:
PURPOSE: To provide an angular sealed storage battery, provided with a positive electrode terminal part, capable of reducing the number of parts and facilitating a manufacture process.
CONSTITUTION: A hole is bored on the middle of a lid plate 1, and a packing 5 is arranged on the lid plate surface and back in the periphery of the hole and the wall surface of the hole. Then, a valve body 4 is inserted in the groove of the packing 5, a positive electrode current collecting terminal 7 is arranged so as to contact the packing 5 on a battery can side, and a rivet 3 is inserted from a hole on a side opposite to the side, where the terminal 7 is arranged, to caulk and integrate cylindrical part lower part of the rivet 3, thereby manufacturing a positive electrode terminal part. A nickel electrode and a hydrogen electrode are used for positive and negative electrodes respectively, the positive and negative electrodes are laminated via a separator to be inserted in a battery can 2, and positive and negative electrode electrode plate terminals are welded to the terminal 7 and the battery can 2 respectively, and then a KOH aqueous solution of 30wt.% is injected into the battery can 2 to fix the lid plate 1 to the battery can 2 by welding, thereby manufacturing an angular sealing type nickel.hydrogen storage battery.



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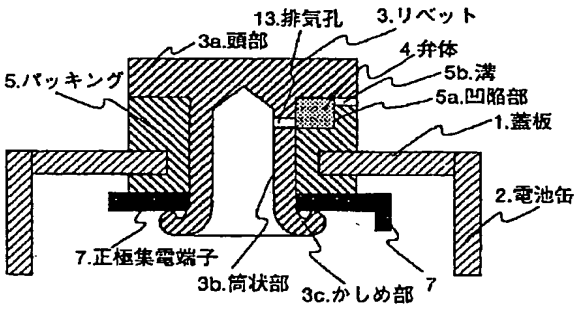
(54)【発明の名称】　角形密閉式蓄電池

(57)【要約】
【目的】部品点数を低減でき、且つ製造工程を簡易にできる正極端子部を備えた角形密閉式蓄電池を提供する。
【構成】蓋板１の中央に穴を開け、穴の周囲の蓋板表裏面及び穴の壁面にパッキング５を配した。次に、弁体４をパッキング５の溝に挿入し、正極集電端子７を電池缶側のパッキング５に接するよう配置し、リベット３を正極集電端子７が配されている側とは逆側の穴から挿入し、リベット３の筒状部下部をかしめ、一体化し、正極端子部を作製した。正極にはニッケル極、負極には水素極を用い、正極、負極をセパレータを介して積層し、電池缶２に挿入し、正極極板端子を正極集電端子７に、負極極板端子を電池缶２にそれぞれ溶接した後３０ｗｔ％のＫＯＨ水溶液を電池缶２内に注入し、蓋板１を溶接で電池缶２に固定し、角形密閉式ニッケル・水素蓄電池を作製した。



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【特許請求の範囲】

【請求項１】中央に設けた穴に正極端子部を装着した金属製の蓋板を、発電要素を収納した電池缶の開口に溶接固定してなる角形密閉式蓄電池において、正極端子部が次の（１）～（３）の構成を備えることを特徴とする角形密閉式蓄電池。

（１）正極端子を兼ねる中実の頭部と、頭部から延長したかしめ用筒状部からなるリベットと、

蓋板の中央に設けた穴周囲の表裏面、穴壁面及び前記筒状部の外周面に密着するパッキングと、

電池缶内に位置する正極集電端子を備え、（２）前記パッキングと蓋板と正極集電端子の重ね合わせ物が、蓋板の穴に通した前記リベットにより、リベットの頭部と筒状部の下端かしめ部との間で一体にかしめ固定されてなり、（３）リベットの筒状部の壁面に設けた排気孔が弁体を介して外部と通じている。

【請求項２】筒状部の壁面に設けた排気孔が、パッキングの内側に形成した凹陥部に面して位置し、外部に通じるように構成した前記凹陥部に弁体を配置したことを特徴とする請求項１記載の角形密閉式蓄電池。

【請求項３】筒状部の壁面に設けた排気孔が、リベットの頭部の裏面に設けた凹陥部に面して位置し、外部に通じるように構成した前記凹陥部に弁体を配置したことを特徴とする請求項１記載の角形密閉式蓄電池。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、角形密閉式蓄電池に関し、特に安全弁を内蔵する正極端子部（電池缶の蓋板に設けられている）の構造の改良に関するものである。

【０００２】

【従来の技術】携帯用機器の電源として用いられている密閉式蓄電池としては、ニッケルーカドミウム電池やニッケルー水素電池などが一般的である。近年、電気機器の薄型化、小型化に伴い、高容量の電池が要求されるようになり、従来の円筒密閉式アルカリ蓄電池に替わり、薄型でスタッキングに有利な角形密閉式蓄電池の需要が急増している。そしてこの角形密閉式蓄電池は、できるだけ薄い構造をしたものが求められている。その場合、電池缶の蓋板に設けた正極端子部の構造が、特に技術的に難しい部分となっている。この部分の構造に関し、実公平４－４３５９号公報においては、第３図に示すような構造が提案されている。図３において、１は金製属の蓋板で、その中央には、中空リベット８を挿入し、また、パッキング５を取り付けるための穴があいている。パッキング５は、中空リベット８ならびに電池缶２内に位置する正極集電端子７と蓋板１との間を絶縁する目的を有している。蓋板１とパッキング５と正極集電端子７の重ね合わせ物に中空リベット８を通し、中空リベット８の下端をかしめることによって、前記重ね合わせ物が一体化されている。同時に、蓋板１の中央に設けた穴周

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囲もパッキング５によってシールされる。９はキャップ状の正極端子であり、中空リベット８の頂部にスポット溶接されている。４はゴム製の弁体であり、中空リベット８の頂部と正極端子９頂部の裏面との間に、中空リベット８の開口をふさぐよう固定されている。何らかの原因によって電池内部が異常に高圧になったときに、弁体４は変形して、電池内で発生したガスを正極端子９に設けた排気孔１２から電池外部に逃がす働きをしている。

【０００３】

【発明が解決しようとする課題】しかしながら、上記図３に示した正極端子部の構造は、部品点数が多いこと、非常に小さい正極端子９を中空リベット８と溶接する工程が極めて複雑であるなどの問題点を含んでいる。本発明の目的は、部品点数を低減でき、且つ製造工程を簡易にできる正極端子部を備えた角形密閉式蓄電池を提供することである。

【０００４】

【課題を解決するための手段】上記問題を解決するために、本発明の角形密閉式蓄電池は、中央に設けた穴に正極端子部を装着した金属製の蓋板を、発電要素を収納した電池缶の開口に溶接固定してなる角形密閉式蓄電池において、正極端子部が次の（１）～（３）の構成を備えることを特徴とする。

【０００５】（１）正極端子を兼ねる中実の頭部と、頭部から延長したかしめ用筒状部からなるリベットと、蓋板の中央に設けた穴周囲の表裏面、穴壁面及び前記筒状部の外周面に密着するパッキングと、電池缶内に位置する正極集電端子を備えている。

【０００６】（２）前記パッキングと蓋板と正極集電端子の重ね合わせ物が、蓋板の穴に通した前記リベットにより、リベットの頭部と筒状部の下端かしめ部との間で一体にかしめ固定されてなる。

【０００７】（３）そして、リベットの筒状部の壁面に設けた排気孔が弁体を介して外部と通じている。リベットの筒状部の壁面に設けた排気孔が弁体を介して外部と通じる具体的な構成は、例えば、当該排気孔が、パッキングの内側に形成した凹陥部に面して位置しており、外部に通じるように構成した前記凹陥部に弁体を配置したことを特徴とする。また、別の具体的な構成は、当該排気孔が、リベットの頭部の裏面に設けた凹陥部に面して位置しており、外部に通じるように構成した前記凹陥部に弁体を配置したことを特徴とする。

【０００８】

【作用】本発明に係る角形密閉式蓄電池は、リベットの頭部が中実（空洞でない）になっており、そのまま正極端子として用いる。また、電池内圧が高くなったときの排気は、リベットの筒状部の壁面に設けた排気孔が弁体を介して外部と通じているので、問題なく行なわれる。従って、従来のようにキャップ状の正極端子をリベット頂部に別途溶接する必要がなく、構造と製作工程が簡略

化される。そして、リベット頭部は中実になっているので、かしめ作業の際に頭部にかかる応力によって頭部が変形する心配はなく、十分なかしめ力で、パッキングと蓋板とリベットの筒状部外周面との密着性（シール性）を確保することができる。電池缶の蓋板を金属製にした理由は、電池缶の封口をレーザ等の溶接で確実に行なえ、それに伴い、正極端子部全体の機械的な強度も十分に得ることができるためである。

【０００９】

【実施例】

実施例１

図１に示すように、中央に設けた穴に正極端子部を装着した金属製の蓋板１を、発電要素を収納した金属製の電池缶２の開口にレーザ溶接により固着してなる角形密閉式蓄電池である。正極端子部は、次のような構成となっている。正極端子部は、正極端子を兼ねる中実の頭部３ａと、頭部３ａから延長したかしめ用筒状部３ｂからなるリベット３と、蓋板１の中央に設けた穴周囲の表裏面、穴壁面及び前記筒状部３ｂの外周面に密着するパッキング５と、電池缶２内に位置する正極集電端子７を備えている。リベット３の頭部３ａは中実であり、直方体形状をしている。また、筒状部３ｂには排気口１３が設けられている。この様子を図２（ａ）に示す。パッキング５はナイロン製であり、蓋板１をインサート物として、蓋板１の穴の周囲にナイロンをインジェクションして成形したものである。また、パッキング５は、内側の一部に凹陥部５ａと凹陥部５ａからパッキング５の外側に通じる溝５ｂを、前記インジェクション成形により同時に設けたものである。蓋板１にインジェクション成形されたパッキング５を図２（ｂ）に示す。上記のパッキング５と蓋板１と正極集電端子７の重ね合わせ物が、蓋板１の穴に通したリベット３により、リベット３の頭部３ａと筒状部３ｂの下端かしめ部３ｃとの間で一体にかしめ固定されている。前記重ね合わせ物に筒状部３ｂを通すとき、パッキング５の凹陥部５ａにはネオプレンゴム製の弁体４を配置しておく。また、前記重ね合わせ物に筒状部３ｂを通したとき、排気口１３が凹陥部５ａに面するように位置合わせをする。弁体４は、筒状部３ｂの外面と凹陥部５ａの壁面との間で適度に圧縮された状態で凹陥部５ａに配置され、排気口１３をふさぐ。上記のような正極端子部の構成で、角形密閉式ニッケル・水素蓄電池を作製した。正極には、水酸化ニッケルを活物質とした公知のニッケル極を用いた。負極には、公知の水素吸蔵合金からなる水素極を用いた。前記正極、負極をナイロン製の不織布セパレータを介して積層し、金属製の電池缶２に挿入し、正極を正極集電端子７に、負極を電池缶２にそれぞれ接続した。その後、３０ｗｔ％のＫＯＨ水溶液を所定量電池缶２内に注入した。蓋板１はレーザ溶接で電池缶２に固着した。この電池は、外形寸法で幅１５．６ｍｍ、厚さ４．８ｍｍである。この角形

密閉式ニッケル・水素蓄電池は、電池内圧が所定値より高くなると、弁体４が変形して排気口１３が開き、溝５ｂを排気通路として電池内のガスが外部に排出される。

【００１０】従来例

実施例１で説明した角形密閉式蓄電池において、図３に示すように正極端子部を構成した。蓋板１とパッキング５と正極集電端子７の重ね合わせ物に中空リベット８を通し、中空リベット８の下端をかしめることによって、前記重ね合わせ物が一体化されている。パッキング５は、実施例１と同様にインジェクション成形により蓋板１の穴周囲に形成されているが、実施例１のような凹陥部及び溝は設けなかった。中空リベット８によるかしめ力は実施例１と同条件となるよう調節した。上記のかしめ一体化の後に、中空リベット８の頂部にキャップ状の正極端子９をスポット溶接した。この溶接に際しては、ネオプレンゴム製の弁体４を正極端子９内に配置し、中空リベット８の頂部と正極端子９頂部の裏面との間に、中空リベット８の開口をふさぐように圧縮状態で固定した。弁体４の圧縮状態は実施例１と同条件とし、実施例１の電池と同じ電池内圧で作動するよう調節した。

【００１１】正極端子部の構成について、実施例１を従来例と比較すると、

（１）部品点数を減らすことができた。つまり、従来例における中空リベット８と正極端子９を、実施例ではリベット３の一つにすることができた。

（２）正極端子部作製の作業工程を減らすことができた。つまり、従来例における中空リベット８と正極端子９との溶接に相当する工程は、実施例１にはない。

の２点について優位性があった。

【００１２】次に、漏液発生率について検討した結果を表１に示す。試験条件は、電池を温度６０℃、湿度９５～１００％の恒温恒湿槽に３０日間放置するという極めてきびしい条件とした。漏液したか否かの判断は、フェノールフタイレン溶液を染み込ませた綿棒を正極端子部に接触さて、綿棒の色の変化を観察する方法により行なった。電池のサンプル数は、実施例１、従来例とも１１０個ずつとした。表１から明らかなように、実施例１の角形密閉式ニッケル・水素蓄電池は、漏液発生率が従来例の１／１０程度であり、著しく少ないことを確認した。従来例の角形密閉式ニッケル・水素蓄電池の電解液の漏れは、主に中空リベット８とパッキング５の界面からであった。実施例１では、リベットの中実の頭部の強度が大きくかしめの力で変形しにくいので、パッキングのシール性が向上しているものと推測される。

【００１３】

【表１】

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	漏液発生率（%）
実施例１	０．９
従来例	９．１

【００１４】また、耐内圧特性を測定した結果を表２に示す。試験方法は、電池缶２の底に穴を開けて調圧器付ガスボンベから電池内に乾燥空気を供給し、そのときの最大圧力を調圧器から読み取る方法である。試験の雰囲気温度は２０℃であり、電池のサンプル数は、実施例１、従来例とも１０個である。表２から明らかなように、実施例の角形密閉式ニッケル・水素蓄電池は、耐内圧特性が安定していることを確認した。また、実施例１の角形密閉式ニッケル・水素蓄電池では、すべて排気孔１３から溝５ｂを通じてガスが排出されているのに対し、従来例では、排気孔１２からガスが排出されているものは2個で、残りはパッキング５と中空リベット８の界面から排出されていることがわかった。従来例の正極＊

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＊端子部の構成は、パッキング５、蓋板１及び正極集電端子７の重ね合わせ物に中空リベット８を通してかしめ一体化した後に、中空リベット８の頂部にキャップ状正極端子９を溶接したものである。従って、従来例では溶接の熱が必然的にパッキング５に伝わることとなる。パッキング５は、熱的影響を受けると塑性変形して、かしめ力が低下し、パッキングとしての役割を十分に果たさなくなってしまったものと推測される。中空リベット８の頂部に正極端子９を溶接してから前記かしめ工程を行うことも考えられるが、その順番で正極端子部を構成すると、かしめ工程でキャップ状の正極端子９にかしめの応力がかかってしまい、正極端子９の変形、それに伴う弁体４の変形が生じる心配がある。正極端子９は非常に小さく、正極端子９を押圧せずにかしめの応力を与えることは実際の作業では難しい。実施例では、溶接工程がないため、上記悪影響はない。

【００１５】

【表２】

	耐内圧特性(kg/cm²)									
実施例１	5.6	6.0	6.3	5.8	5.9	6.0	6.2	6.3	5.9	5.8
従来例	4.1	3.2	2.8	3.2	5.8	4.2	6.3	4.5	1.2	3.0

【００１６】実施例２

実施例１で説明した角形密閉式蓄電池において、図４に示すように正極端子部を構成した。リベット３の頭部３ａの裏面に凹陥部３ｄと凹陥部３ｄから外部に通じる溝３ｅを設ける。蓋板１にインジェクション成形で設けたパッキング５は従来例と同様である。パッキング５と蓋板１と正極集電端子７の重ね合わせ物が、蓋板１の穴に通したリベット３により、リベット３の頭部３ａと筒状部３ｂの下端かしめ部３ｃとの間で一体にかしめ固定されている。前記重ね合わせ物に筒状部３ｂを通すとき、凹陥部３ｄにはネオプレンゴム製の弁体４を配置しておく。また、前記重ね合わせ物に筒状部３ｂを通したとき、排気口１３が凹陥部３ｄに面するように位置合わせをする。弁体４は、筒状部３ｂの外面と凹陥部５ａの壁面との間で適度に圧縮された状態で凹陥部３ｄに配置され、排気口１３をふさぐ。電池内圧が所定値より高くなると、弁体４が変形して排気口１３が開き、溝３ｅを排気通路として電池内のガスが外部に排出される。

【００１７】実施例３

実施例１で説明した角形密閉式蓄電池において、図５に示すように正極端子部を構成した。リベット３の頭部３ａの裏面にリング状凹陥部３ｆと凹陥部３ｆから外部に通じる溝３ｅを設ける。蓋板１にインジェクション成形で設けたパッキング５は従来例と同様である。パッキング５と蓋板１と正極集電端子７の重ね合わせ物が、蓋板１の穴に通したリベット３により、リベット３の頭部３ａと筒状部３ｂの下端かしめ部３ｃとの間で一体にかしめ固定されている。前記重ね合わせ物に筒状部３ｂを通すとき、リング状凹陥部３ｆにはネオプレンゴム製のリング状弁体４を配置しておく。また、前記重ね合わせ物に筒状部３ｂを通したとき、排気口１３がリング状凹陥部３ｆに面するように位置合わせをする。リング状弁体４は、リング状凹陥部３ｆの底面とパッキング５の上面との間で適度に圧縮された状態でリング状凹陥部３ｆに配置され、排気口１３と外部を隔絶する。電池内圧が所定値より高くなると、弁体４が変形して弁体４と排気口１３との間に隙間が生じ、溝３ｅを排気通路として電池内のガスが外部に排出される。

【００１８】上記実施例２、実施例３の構成を備えた電池についても、実施例１と同様の効果が得られた。

【００１９】上記実施例では、角形密閉式ニッケル・水素蓄電池について検討したが、本発明はその他の角形密閉式蓄電池についても適用可能である。

【００２０】

【発明の効果】上述したように、本発明係る角形密閉式蓄電池は、部品点数を低減でき、且つ、製造工程も簡易化できる。また、耐漏液性、耐内圧特性の優れた角形密閉式蓄電池を提供することができる。

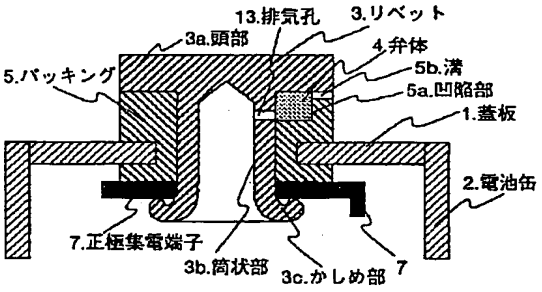
【図面の簡単な説明】

【図１】実施例１で用いた角形密閉式蓄電池の正極端子部を示す要部断面図である。

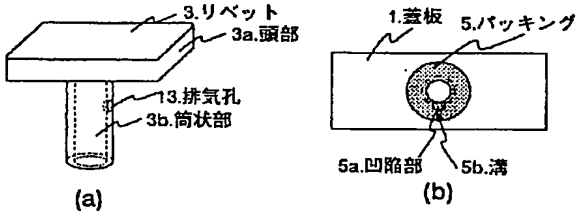
【図２】（ａ）は実施例１で用いた正極端子を兼ねるリベット３の斜視図である。（ｂ）は実施例１で用いた、蓋板にパッキングを配した状態の上面図である。

【図３】従来例の角形密閉式蓄電池の正極端子構造を示す要部断面図である。
【図４】実施例２の角形密閉式蓄電池の正極端子部を示す要部断面図である。
【図５】実施例３の角形密閉式蓄電池の正極端子部を示す要部断面図である。
【符号の説明】
１．蓋板
２．電池缶
３．リベット
３ａ．頭部
３ｂ．筒状部
３ｃ．かしめ部
＊３ｄ．凹陥部
３ｅ．溝
３ｆ．リング状凹陥部
４．弁体
５．パッキング
５ａ．凹陥部
５ｂ．溝
７．正極集電端子
８．中空リベット
９．正極端子
１２．排気孔
１３．排気孔

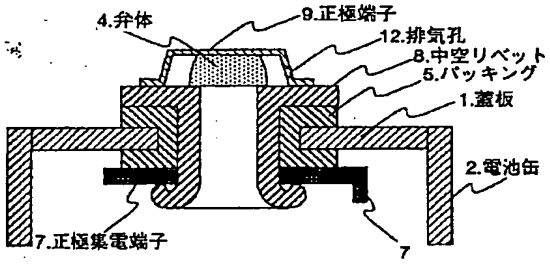
【図１】



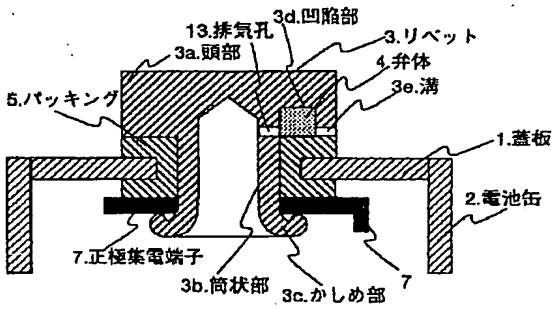
【図２】



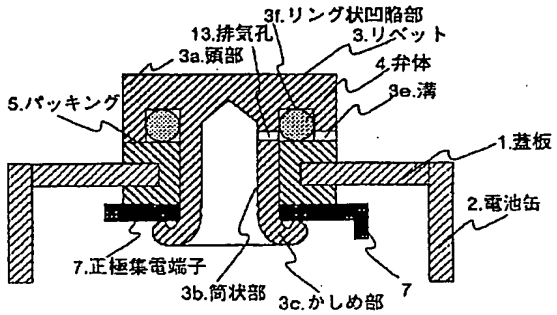
【図３】



【図４】



【図５】



JAPANESE [JP,08-287896,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS OPERATION EXAMPLE DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

* NOTICES *

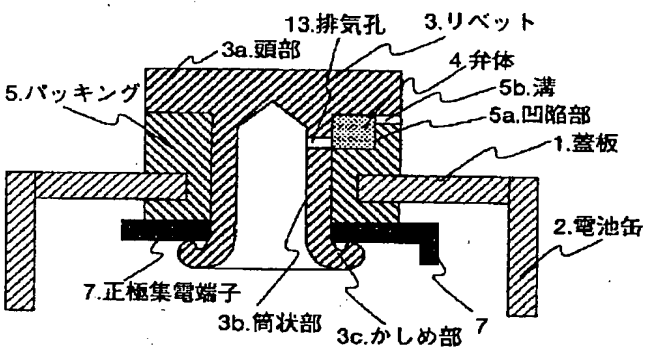
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The square shape closed storage battery characterized by a positive-electrode terminal area equipping with the configuration of following (1) - (3) opening of the cell can which contained the generation-of-electrical-energy element for the metal cover plate which equipped with the positive-electrode terminal area the hole prepared in the center in the square shape closed storage battery which comes to carry out welding immobilization.
(1) The rivet which consists of a head of the solid which serves as a positive-electrode terminal, and a tubed part for caulkings extended from the head, Packing stuck to the front rear face of the perimeter of a hole prepared in the center of a cover plate, a hole wall side, and the peripheral face of said tubed part, the positive-electrode current collection terminal located in a cell can -- having -- (2) -- said packing and cover plate, and the superposition object of a positive-electrode current collection terminal with said rivet which it let pass in the hole of a cover plate The exhaust hole which came to carry out caulking immobilization between the head of a rivet and the lower limit caulking section of a tubed part at one, and was prepared in the wall surface of the tubed part of (3) rivets leads to the exterior through the valve element.
[Claim 2] The square shape closed storage battery according to claim 1 characterized by having arranged the valve element to said cavity constituted so that the exhaust hole prepared in the wall surface of a tubed part might face the cavity formed inside packing, might be located and might lead outside.
[Claim 3] The square shape closed storage battery according to claim 1 characterized by having arranged the valve element to said cavity constituted so that the exhaust hole prepared in the wall surface of a tubed part might face the cavity prepared in the rear face of the head of a rivet, might be located and might lead outside.

[Translation done.]

Drawing selection Representative drawing



[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] Especially this invention relates to amelioration of the structure of the positive-electrode terminal area (prepared in the cover plate of a cell can) which builds in a relief valve about a square shape closed storage battery.
[0002]
[Description of the Prior Art] As a closed storage battery used as a power source of a portable equipment, a nickel-cadmium battery, a nickel hydoride battery, etc. are common. In recent years, with thin-shape-izing of an electrical machinery and apparatus, and a miniaturization, the cell of high capacity comes to be required, the conventional cylinder direct-vent-system alkaline battery is replaced, and the need of a square shape closed storage battery advantageous to a stacking is increasing rapidly with the thin shape. And what has the structure where this square shape closed storage battery is possible the thinnest is called for. In that case, the structure of a positive-electrode terminal area prepared in the cover plate of a cell can serves as a difficult part technically especially. In JP,4-4359,Y, structure as shown in Fig. 3 is proposed about the structure of this part. In drawing 3 , 1 is the cover plate of a gold group and the hole for inserting the hollow rivet 8 in the center, and attaching packing 5 in it has opened. Packing 5 has the purpose which insulates between the positive-electrode current collection terminals 7 and cover plates 1 which are located in the hollow rivet 8 and the cell can 2. Said superposition object is united with a cover plate 1, packing 5, and the superposition object of the positive-electrode current collection terminal 7 by closing the lower limit of through and the hollow rivet 8 in the hollow rivet 8. The seal also of the hole perimeter prepared in the center of a cover plate 1 is carried out to coincidence with packing 5. 9 is a cap-like positive-electrode terminal and spot welding is carried out to the crowning of the hollow rivet 8. 4 is a valve element made of rubber, and it is being fixed so that opening of the hollow rivet 8 may be plugged up between the crowning of the hollow rivet 8, and the rear face of positive-electrode terminal 9 crowning. When the interior of a cell becomes high pressure unusually according to a certain cause, a valve element 4 deforms and is serving to miss to the cell exterior from the exhaust hole 12 which formed the gas which occurred within the cell in the positive-electrode terminal 9.
[0003]
[Problem(s) to be Solved by the Invention] however, the structure of a positive-electrode terminal area shown in above-mentioned drawing 3 having many components mark and the process which welds the very small positive-electrode terminal 9 with the hollow rivet 8 are very complicated -- etc. -- the trouble is included. The purpose of this invention is offering the square shape closed storage battery equipped with the positive-electrode terminal area which can reduce components mark and can simplify a production process.
[0004]
[Means for Solving the Problem] In order to solve the above-mentioned problem, the square shape closed storage battery of this invention is characterized by a positive-electrode terminal area equipping with the configuration of following (1) - (3) opening of the cell can which contained the generation-of-electrical-energy element for the metal cover plate which equipped with the positive-electrode terminal area the hole prepared in the center in the square shape closed storage battery which comes to carry out welding immobilization.
[0005] (1) It has packing stuck to the front rear face of the perimeter of a hole prepared in the rivet which consists of a head of the solid which serves as a positive-electrode terminal, and a tubed part for caulkings extended from the head, and the center of a cover plate, a hole wall side, and the peripheral face of said tubed part, and the positive-electrode current collection terminal located in a cell can.
[0006] (2) It comes to carry out caulking immobilization of said packing and cover plate, and the superposition

object of a positive-electrode current collection terminal between the head of a rivet, and the lower limit caulking section of a tubed part at one with said rivet which it let pass in the hole of a cover plate.
[0007] (3) And the exhaust hole prepared in the wall surface of the tubed part of a rivet leads to the exterior through the valve element. The concrete configuration to which the exhaust hole prepared in the wall surface of the tubed part of a rivet leads to the exterior through a valve element is characterized by having arranged the valve element to said cavity constituted so that the exhaust hole concerned might face the cavity formed inside packing, might be located and might lead outside for example. Moreover, another concrete configuration is characterized by having arranged the valve element to said cavity constituted so that the exhaust hole concerned might face the cavity prepared in the rear face of the head of a rivet, might be located and might lead outside.
[0008]
[Function] The head of a rivet is a solid (it is not a cavity), and the square shape closed storage battery concerning this invention is used as a positive-electrode terminal as it is. Moreover, since the exhaust hole prepared in the wall surface of the tubed part of a rivet leads to the exterior through the valve element, exhaust air when cell internal pressure becomes high is performed satisfactory. Therefore, it is not necessary to weld a cap-like positive-electrode terminal to a rivet crowning separately like before, and structure and a manufacture process are simplified. And since the rivet head section is a solid, with the stress applied to a head in the case of a caulking activity, there is no fear of a head deforming, it is sufficient caulking force and the adhesion (seal nature) of packing, a cover plate, and the tubed part peripheral face of a rivet can be secured. The reason for having made the cover plate of a cell can into metal is because obturation of a cell can can be ensured by welding of laser etc. and the mechanical reinforcement of the whole positive-electrode terminal area can also fully be obtained in connection with it.
[0009]
[Example]
As shown in example 1 drawing 1 , it is the square shape closed storage battery which comes to fix the metal cover plate 1 which equipped with the positive-electrode terminal area the hole prepared in the center by laser welding to opening of the metal cell can 2 which contained the generation-of-electrical-energy element. The positive-electrode terminal area has the following composition. The positive-electrode terminal area is equipped with the packing 5 stuck to the front rear face of the perimeter of a hole prepared in head 3a of the solid which serves as a positive-electrode terminal, the rivet 3 which consists of tubed part 3for caulkings b extended from head 3a, and the center of a cover plate 1, a hole wall side, and the peripheral face of said tubed part 3b, and the positive-electrode current collection terminal 7 located in the cell can 2. Head 3a of a rivet 3 is a solid, and is carrying out the rectangular parallelepiped configuration. Moreover, the exhaust port 13 is established in tubed part 3b. This situation is shown in drawing 2 (a). Packing 5 is a product made of nylon, and by using a cover plate 1 as an insertion object, injection of the nylon is carried out around the hole of a cover plate 1, and it fabricates it to it. Moreover, packing 5 prepares in coincidence slot 5b which leads from cavity 5a and cavity 5a to inside [a part of] on the outside of packing 5 with said injection shaping. The packing 5 by which injection shaping was carried out is shown in a cover plate 1 at drawing 2 (b). Caulking immobilization of the above-mentioned packing 5, a cover plate 1, and the superposition object of the positive-electrode current collection terminal 7 is carried out at one between head 3a of a rivet 3, and lower limit caulking section 3c of tubed part 3b with the rivet 3 which it let pass in the hole of a cover plate 1. When letting tubed part 3b pass in said superposition object, to cavity 5a of packing 5, the valve element 4 made of neoprene rubber is arranged. Moreover, when it lets tubed part 3b pass in said superposition object, alignment is carried out so that an exhaust port 13 may face cavity 5a. A valve element 4 is arranged at cavity 5a in the condition of having been moderately compressed between the external surface of tubed part 3b, and the wall surface of cavity 5a, and takes up an exhaust port 13. With the configuration of the above positive-electrode terminal areas, square shape direct-vent-system nickel and a hydrogen battery were produced. The well-known nickel pole which used nickel hydroxide as the active material was used for the positive electrode. The hydrogen pole which consists of a well-known hydrogen storing metal alloy was used for the negative electrode. The laminating of said positive electrode and the negative electrode was carried out through the nonwoven fabric separator made of nylon, and it inserted in the metal cell can 2, and the positive electrode was connected to the positive-electrode current collection terminal 7, and the negative electrode was connected to the cell can 2, respectively. Then, the 30wt% KOH water solution was poured in into the specified quantity cell can 2. The cover plate 1 fixed with the cell can 2 by laser welding. This cell is 4.8mm in width of face of 15.6mm, and thickness in a dimension. If cell internal pressure becomes higher than a predetermined value, a valve element 4 deforms, an exhaust port 13 will open, will make slot 5b a flueway, and, as for this square shape direct-vent-system nickel and hydrogen battery, the gas in a cell will be discharged outside.

[0010] In the square shape closed storage battery explained in the conventional example example 1, as shown in drawing 3 , the positive-electrode terminal area was constituted. Said superposition object is united with a cover plate 1, packing 5, and the superposition object of the positive-electrode current collection terminal 7 by closing the lower limit of through and the hollow rivet 8 in the hollow rivet 8. Packing 5 did not prepare the cavity and slot like an example 1, although formed in the perimeter of a hole of a cover plate 1 by injection shaping like the example 1. The caulking force by the hollow rivet 8 was adjusted so that it might become an example 1 and these conditions. After the above-mentioned caulking unification, spot welding of the cap-like positive-electrode terminal 9 was carried out to the crowning of the hollow rivet 8. On the occasion of this welding, the valve element 4 made of neoprene rubber has been arranged in the positive-electrode terminal 9, and it fixed in the state of compression so that opening of the hollow rivet 8 might be plugged up between the crowning of the hollow rivet 8, and the rear face of positive-electrode terminal 9 crowning. The compression condition of a valve element 4 was made into an example 1 and these conditions, and it was adjusted so that it might operate with the same cell internal pressure as the cell of an example 1.

[0011] About the configuration of a positive-electrode terminal area, (1) component mark were able to be reduced for the example 1 as compared with the conventional example. That is, the hollow rivet 8 and the positive-electrode terminal 9 in the conventional example were able to be set to one of the rivets 3 in the example.

(2) The routing of positive-electrode terminal area production was able to be reduced. That is, there is no process equivalent to welding with the hollow rivet 8 and the positive-electrode terminal 9 in the conventional example in an example 1.

It was predominant about two **.

[0012] Next, the result of having examined the liquid spill incidence rate is shown in Table 1. a test condition -- a cell -- the constant temperature of the temperature of 60 degrees C, and 95 - 100% of humidity -- it considered as the very severe conditions of leaving it for 30 days in a constant humidity chamber. Decision whether it spilt liquid performed the cotton swab into which the phenol free-wheel-plate ylene solution was infiltrated by the approach of observing contact, now change of the color of a cotton swab to the positive-electrode terminal area. It made the measurement size of a cell into 110 pieces at a time also with the example 1 and the conventional example. A liquid spill incidence rate is about [of the conventional example] 1/10, and the square shape direct-vent-system nickel and the hydrogen battery of an example 1 checked few [remarkably] things so that clearly from Table 1. The leakage of the electrolytic solution of the square shape direct-vent-system nickel and the hydrogen battery of the conventional example was mainly from the interface of the hollow rivet 8 and packing 5. In the example 1, since it is hard to deform the reinforcement of the head of the solid of a rivet by the force of a caulking greatly, that whose seal nature of packing is improving is conjectured.

[0013]

[Table 1]

	漏液発生率（%）
実施例1	0．9
従来例	9．1

[0014] Moreover, the result of having measured the internal pressure-proof property is shown in Table 2. A test method is an approach of making a hole in the bottom of the cell can 2, supplying dry air in a cell from a chemical cylinder with a pressure governor, and reading the maximum pressure at that time in a pressure governor. Experimental ambient temperature is 20 degrees C, and the number of an example 1 and the conventional examples of the measurement size of a cell is ten. It checked that the internal pressure-proof property of the battery [the square shape direct-vent-system nickel and the hydrogen battery] of an example was stable so that clearly from Table 2. Moreover, by the square shape direct-vent-system nickel and the hydrogen battery of an example 1, to gas being altogether discharged through slot 5b from the exhaust hole 13, the number of those by which gas is discharged from the exhaust hole 12 is two, and it turned out in the conventional example that the remainder is discharged from the interface of packing 5 and the hollow rivet 8. The configuration of the positive-electrode terminal area of the conventional example welds the cap-like positive-electrode terminal 9 to the crowning of the hollow rivet 8, after carrying out caulking unification through the hollow rivet 8 at packing 5, a cover plate 1, and the superposition object of the positive-electrode current collection terminal 7. Therefore, in the conventional example, the heat of welding will get across to packing 5 inevitably. If thermal influenced, it will deform plastically, and the caulking force declines, and it is guessed that packing 5 is the thing which has stopped fully

playing a role of packing. After welding the positive-electrode terminal 9 to the crowning of the hollow rivet 8, performing said caulking process is also considered, but when a positive-electrode terminal area is constituted from the sequence, the stress of a caulking is applied to the cap-like positive-electrode terminal 9 at a caulking process, and there are deformation of the positive-electrode terminal 9 and a fear of deformation of the valve element 4 accompanying it arising. The positive-electrode terminal 9 is very small, and it is difficult in an actual activity to give the stress of a caulking, without pressing the positive-electrode terminal 9. In the example, since there is nothing like a welding operator, there is no above-mentioned bad influence.

[0015]

[Table 2]

	耐内圧特性(kg/cm^2)									
実施例1	5.6	6.0	6.3	5.8	5.9	6.0	6.2	6.3	5.9	5.8
従来例	4.1	3.2	2.8	3.2	5.8	4.2	6.3	4.5	1.2	3.0

[0016] In the square shape closed storage battery explained in the example 2 example 1, as shown in drawing 4 , the positive-electrode terminal area was constituted. Slot 3e which leads outside from 3d of cavities and 3d of cavities is prepared in the rear face of head 3a of a rivet 3. The packing 5 prepared in the cover plate 1 with injection shaping is the same as that of the conventional example. Caulking immobilization of packing 5, a cover plate 1, and the superposition object of the positive-electrode current collection terminal 7 is carried out at one between head 3a of a rivet 3, and lower limit caulking section 3c of tubed part 3b with the rivet 3 which it let pass in the hole of a cover plate 1. When letting tubed part 3b pass in said superposition object, to 3d of cavities, the valve element 4 made of neoprene rubber is arranged. Moreover, when it lets tubed part 3b pass in said superposition object, alignment is carried out so that an exhaust port 13 may face 3d of cavities. A valve element 4 is arranged at 3d of cavities in the condition of having been moderately compressed between the external surface of tubed part 3b, and the wall surface of cavity 5a, and takes up an exhaust port 13. If cell internal pressure becomes higher than a predetermined value, a valve element 4 will deform, an exhaust port 13 will open, and the gas in a cell will be discharged outside by making slot 3e into a flueway.

[0017] In the square shape closed storage battery explained in the example 3 example 1, as shown in drawing 5 , the positive-electrode terminal area was constituted. Slot 3e which leads outside from 3f of ring-like cavities and 3f of cavities is prepared in the rear face of head 3a of a rivet 3. The packing 5 prepared in the cover plate 1 with injection shaping is the same as that of the conventional example. Caulking immobilization of packing 5, a cover plate 1, and the superposition object of the positive-electrode current collection terminal 7 is carried out at one between head 3a of a rivet 3, and lower limit caulking section 3c of tubed part 3b with the rivet 3 which it let pass in the hole of a cover plate 1. When letting tubed part 3b pass in said superposition object, to 3f of ring-like cavities, the ring-like valve element 4 made of neoprene rubber is arranged. Moreover, when it lets tubed part 3b pass in said superposition object, alignment is carried out so that an exhaust port 13 may face 3f of ring-like cavities. The ring-like valve element 4 is arranged at 3f of ring-like cavities in the condition of having been moderately compressed between the base of 3f of ring-like cavities, and the top face of packing 5, and is isolated in an exhaust port 13 and the exterior. If cell internal pressure becomes higher than a predetermined value, a valve element 4 will deform, a clearance will be generated between a valve element 4 and an exhaust port 13, and the gas in a cell will be discharged outside by making slot 3e into a flueway.

[0018] The same effectiveness as an example 1 was acquired also about the cell equipped with the configuration of the above-mentioned example 2 and an example 3.

[0019] In the above-mentioned example, although square shape direct-vent-system nickel and a hydrogen battery were examined, this invention is applicable also about other square shape closed storage batteries.

[0020]

[Effect of the Invention] As mentioned above, this invention **** square shape closed storage battery can reduce components mark, and can also simplify a production process. Moreover, the square shape closed storage battery which was excellent in liquid spill-proof nature and an internal pressure-proof property can be offered.

[Translation done.]

* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the important section sectional view showing the positive-electrode terminal area of the square shape closed storage battery used in the example 1.
[Drawing 2] (a) is the perspective view of the rivet 3 which serves as the positive-electrode terminal used in the example 1. (b) is the plan in the condition of having arranged packing on the cover plate used in the example 1.
[Drawing 3] It is the important section sectional view showing the positive-electrode terminal structure of the square shape closed storage battery of the conventional example.
[Drawing 4] It is the important section sectional view showing the positive-electrode terminal area of the square shape closed storage battery of an example 2.
[Drawing 5] It is the important section sectional view showing the positive-electrode terminal area of the square shape closed storage battery of an example 3.
[Description of Notations]
1. Cover Plate
2. Cell Can
3. Rivet
3a. Head
3b. Tubed part
3c. caulking section
3d. cavity
3e. Slot
3f. ring-like cavity
4. Valve Element
5. Packing
5a. Cavity
5b. Slot
7. Positive-Electrode Current Collection Terminal
8. Hollow Rivet
9. Positive-Electrode Terminal
12. Exhaust Hole
13. Exhaust Hole

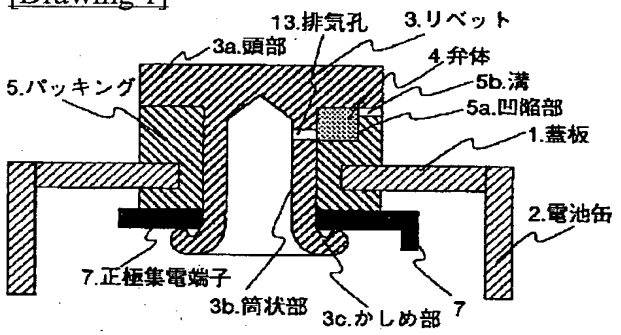
[Translation done.]

* NOTICES *

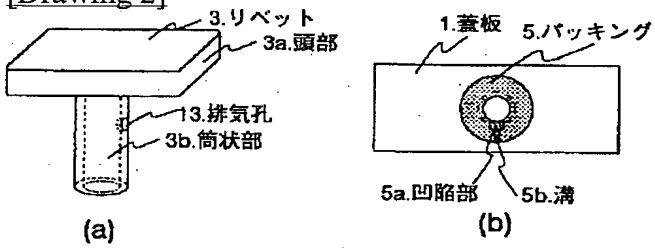
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

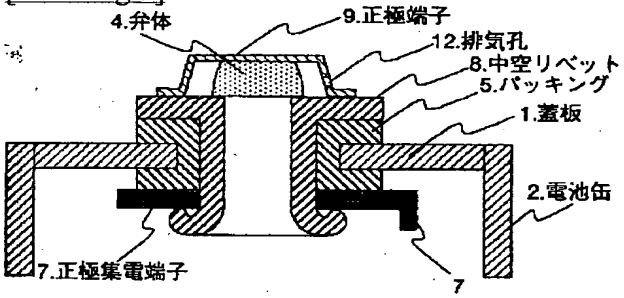
[Drawing 1]



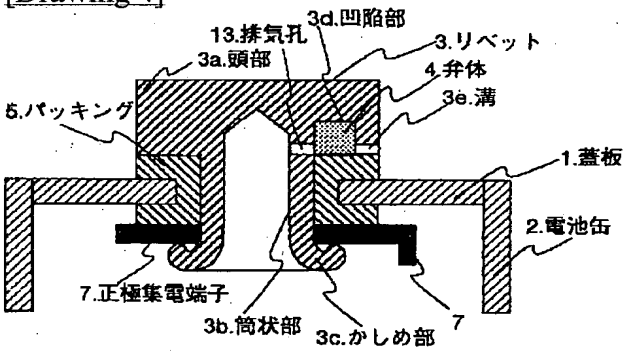
[Drawing 2]



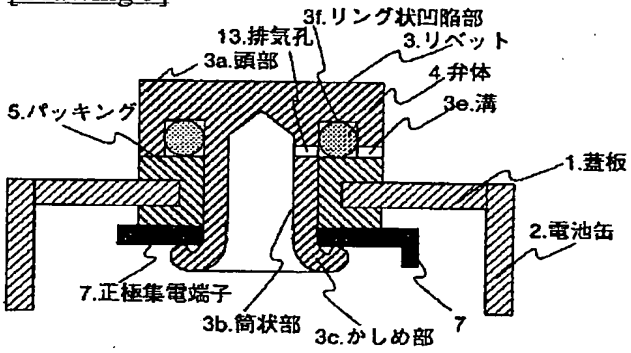
[Drawing 3]



[Drawing 4]



[Drawing 5]



[Translation done.]